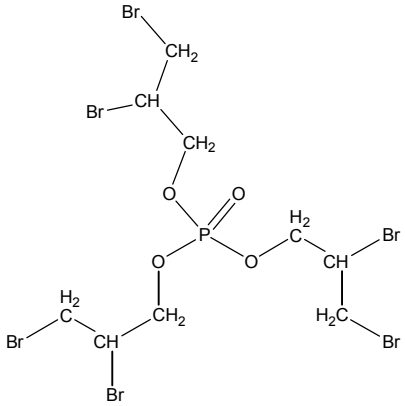
TRIS(2,3-DIBROMOPROPYL) PHOSPHATE
CAS No. 126-72-7
First listed in the *Second Annual Report on Carcinogens*



CARCINOGENICITY

tris(2,3-Dibromopropyl) phosphate is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (NCI 76, 1978; IARC V.20, 1979; IARC S.7, 1987). When administered in the diet, tris(2,3-dibromopropyl) phosphate increased the incidences of kidney tubular cell adenomas or adenocarcinomas in rats of both sexes and male mice, hepatocellular carcinomas or adenomas in female mice, and forestomach squamous cell papillomas or carcinomas and bronchiolar/alveolar adenomas or carcinomas in mice of both sexes (NCI 76, 1978). When administered topically, tris(2,3-dibromopropyl) phosphate increased the incidences of tumors of the skin, lung, forestomach, and oral cavity in female mice (IARC V.20, 1979).

There is inadequate evidence for the carcinogenicity of tris(2,3-dibromopropyl) phosphate in humans (IARC S.7, 1987). In a cohort mortality study of workers with exposure to many compounds, including tris(2,3-dibromopropyl) phosphate, a statistically insignificant number of deaths due to cancer was observed.

PROPERTIES

tris(2,3-Dibromopropyl) phosphate is a viscous, pale yellow or a dense nearly colorless liquid. It is insoluble in water and miscible with carbon tetrachloride, chloroform, and methylene chloride. The compound is hydrolyzed by acids and bases. tris(2,3-Dibromopropyl) phosphate is available in the United States in at least two grades. Typical impurities include 2,3-dibromopropanol, 1,2,3-tribromopropane, and 1,2-dibromo-3-chloropropane.

USE

tris(2,3-Dibromopropyl) phosphate is no longer used in the United States. Previously, it was used primarily as a flame retardant additive for synthetic textiles and plastics. It was also recommended for use in phenolic resins, paints, paper coatings, and rubber. Although CPSC

banned the use of tris(2,3-dibromopropyl) phosphate in 1977, the ban was not fully enforced. In 1978, the Commission identified 22 products containing the compound that were commercially available, including children's clothing, industrial uniforms, draperies, tent fabric, automobile headliners, epoxy resins for the electronics industry, Christmas decorations, and polyester thread (IARC V.20, 1979).

PRODUCTION

There is no evidence that tris(2,3-dibromopropyl) phosphate is currently produced in or exported from the United States. The Chem Sources USA directory identified seven distributors but no producers of the compound in 1986 (Chem Sources, 1986). The 1979 TSCA Inventory reported that three manufacturers produced 605,000 lb in 1977. The CBI Aggregate was between 1 million and 100 million lb (TSCA, 1979). In 1975, domestic production was estimated to be between 9 million and 12 million lb (IARC V.20, 1979). No data on imports or exports were available. Commercial production was first reported in the United States in 1959 (IARC V.20, 1979).

EXPOSURE

The primary routes of potential human exposure to tris(2,3-dibromopropyl) phosphate are inhalation, dermal contact, and ingestion. When released to soil it leaches slowly to ground water, and under basic conditions it will hydrolyze. In water it will rapidly hydrolyze. In atmosphere it will sorb to particulate matter and react with photochemically produced hydroxyl radicals (half-life 3.74 days). Since the compound is no longer produced in the United States, the potential for exposure should be small. However, since CPSC has determined that it is present in some consumer products, the risk of exposure to tris(2,3-dibromopropyl) phosphate has not been eliminated. The compound persists in fabric and plastics, making occupational and consumer exposure possible. The chemical was widely used in children's sleepwear and mattresses, which presents a continuing risk if the items are "handed down" or reused (USEPA, 1983). CPSC estimated that over a 6-year period, a child wearing clothing treated with tris(2,3-dibromopropyl) phosphate could absorb from 2 to 77 mg of the compound/kg body weight. Approximately 180 µg/day is absorbed through the skin of children wearing treated polyester pajamas (IARC V.20, 1979); more recently, the Commission indicated that concentrations may be higher. Since the compound is still available in the United States, it is likely that workers involved in its use are potentially exposed to the compound. The National Occupational Hazard Survey, conducted by NIOSH from 1972 to 1974, estimated that 29,000 workers were potentially exposed to tris(2,3-dibromopropyl) phosphate by dermal contact in the workplace, primarily in the telephone communication industry (NIOSH, 1976). This figure has probably decreased substantially since production was banned. tris(2,3-Dibromopropyl) phosphate does not occur naturally, but it has been detected in food and water. EPA estimated that as much as 10% of U.S. production entered the environment from textile finishing plants and laundries and that the rest would be disposed as solid waste (IARC V.20, 1979).

REGULATIONS

CPSC acted under the Federal Hazardous Substances Act (FHSA) to remove all tris(2,3-dibromopropyl) phosphate-treated children's clothing from the market, as well as other consumer products containing tris(2,3-dibromopropyl) phosphate. CPSC also prohibited the export of such

products. As a result, about 20 million garments were recalled and some destroyed; however, some still may be in warehouses. Some tris(2,3-dibromopropyl) phosphate-treated children's sleepwear, manufactured prior to the bans and stored in warehouses, may reappear illegally in the marketplace. Consumers who suspect they may be purchasing pre-1978 tris(2,3-dibromopropyl) phosphate-treated sleepwear are advised to contact the manufacturer or call the CPSC Hotline at (800) 638-2772. EPA regulates tris(2,3-dibromopropyl) phosphate under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), Superfund Amendments and Reauthorization Act (SARA), and Toxic Substances Control Act (TSCA). Under CERCLA, EPA has established a reportable quantity (RQ) of 10 lb to control releases of tris(2,3-dibromopropyl) phosphate. Releases of the compound are also regulated under RCRA and SARA. Reporting requirements have been established under TSCA for any production, use, or import of the compound. OSHA regulates tris(2,3-dibromopropyl) phosphate under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table B-148.